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Message Text

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ACTION NEA-07

INFO OCT-01 SS-14 ISO-00 INR-05 EB-03 OES-02 SP-01 L-01

/034 W
---------- 017231
R 051033Z JUL 76
FM AMEMBASSY TEHRAN
TO SECSTATE WASHDC 7922
INFO AMEMBASSY JIDDA
AMEMBASSY KUWAIT

C O N F I D E N T I A L SECTION 1 OF 2 TEHRAN 6774

STADIS//////////////////////

LIMDIS

FOR NAAS, NEA/IRN

E.O. 11652: GDS
TAGS: ENRG, IR
SUBJ: IRAN'S OIL RESERVES AND FUTURE PRODUCTION

REF: NAAS'S LETTER TO MIKLOS

1. SUMMARY: BEST BET IS THAT IRAN WILL REMAIN MAJOR OIL EXPORTER THROUGH MOST OF 1980'S, BUT LIKELY TO BE IN SHARP DECLINE BY LATE 80'S, EARLY 90'S. THERE IS MUCH GUESSWORK IN PROJECTION OF IRAN'S FUTURE CAPACITY DUE TO COMPLEXITY OF OIL RESERVOIRS AND MANY UNQUANTIFIABLE UNCERTAINTIES ABOUT THEIR PERFORMANCE UNDER GAS INJECTION. THIS CABLE CONCERNS ITSELF PRIMARILY WITH THE KHUZESTAN FIELDS WHICH ACCOUNT AND WILL CONTINUE TO ACCOUNT FOR THE GREAT MAJORITY OF IRAN'S RESERVES AND PRODUCTION. THE JOINT VENTURES AND OTHER EXPLORATION/ DEVELOPMENT ACTIVITIES ARE DEALT WITH BRIEFLY IN THE FINAL PARAGRAPH. END SUMMARY.

2. CUMULATIVE PRODUCTION FROM THE KHUZESTAN FIELDS AS OF 12/31/75 TOTALLED 30.8 BILLION BARRELS. REMAINING
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PRIMARY RESERVES ARE ABOUT 45 BILLION BARRELS. OFFICIAL

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ESTIMATE OF SECONDARY RESERVES(AN EXTREMELY UNCERTAIN
FIGURE) IS 13.7 BILLION BARRELS. SUCH FIGURES SHOULD BE
NOTED ARE PARTICULARLY SHAKY IN IRAN. IRANIAN OIL RESER-
VOIRS ARE AMONG THE WORLD'S MOST COMPLEX; THEIR BEHAVIOR
IS EXTREMELY DIFFICULT TO PREDICT. MOST OF THE RESERVOIRS
CONSIST OF A LIMESTONE THAT IS HIGLY POROUS(LOTS OF SPACE
INSIDE THE ROCK) BUT NOT SO HIGHLY PERMEABLE(THE SPACE
INSIDE THE ROCK IS NOT WELL INTER-CONNECTED). LOW PREMEABILITY
OF THE ROCK IS MORE THAN COMPENSATED, HOWEVER, BY THE EXTENSIVE
FRACTURING IN THE ROCK OF THE RESERVOIR: THE OIL FLOWS EASILY
AND RAPIDLY THROUGH THE FRACTURE-SPACE. THE STANDARD MODERN
METHOD OF PREDICTING FUTURE RESERVOIR BEHAVIOR IS TO EXTRACT
CORE SAMPLES OF ROCK FROM THE RESERVOIR AND THEN IN A
LABORATORY TO SIMULATE RESERVOIR CONDITIONS OF TEMPERATURE,
PRESSURE AND SO ON IN THESE CORE SAMPLES. THE LABORATORY CAN
THEN DETERMINE CERTAIN KEY VARIABLES(CHARACTERISTICS OF THE
ROCK) WHICH DETERMINE RESERVOIR PERFORMANCE. THE VALUES
OF THESE VARIABLES CAN THEN BE INTRODUCED INTO A COMPUTER
MODEL DESIGNED TO SIMULATE RESERVOIR PERFORMANCE, AND THE
MODEL CAN THEN BE USED TO PREDICT HOW THE RESERVOIR WILL
BEHAVE, FOR EXAMPLE, UNDER GAS INJECTION OR WATER INJECTION.
(THE PURPOSE OF INJECTION OF ANY FLUID, OF COURSE, IS TO
MAINTAIN OR TO REDUCE THE RATE OF DECLINE OF
PRESSURE IN THE RESERVOIR, AND THUS TO BE ABLE
TO PRODUCE DURING THE ECONOMIC LIFE OF THE RESERVOIR
HIGHER PERCENTAGE OF THE OIL IN PLACE.)

3. THE PROBLEM WITH IRANIAN RESERVOIRS IS THAT THE IMPORTANT
VARIABLES CANNOT BE DETERMINED IN THE LABORATORY WITH
SUFFICIENT ACCURACY TO GET CONSISTENT AND DEPENDABLE ANSWERS
FROM THE METHOD OF COMPUTER MODELLING OF THE RESERVOIR'S
BEHAVIOR. THESE VARIABLES INCLUDE SUCH THINGS AS THE
VOLUME AND DISTRIBUTION OF FRACTURE-SPACE IN THE
RESERVOIR, THE TENDENCY OF WATER TO DISPLACE HYDROCARBONS
FROM THE PORE-SPACE OR OF HYDROCARBON TO DISPLACE WATER
AND THE INTERFACIAL TENSION BETWEEN THE FRACTURE SPACE
AND THE INTERIOR OF THE ROCK. FOR SUCH VARIABLES IN THE
CASE OF IRANIAN RESERVOIRS THE BEST A LABORATORY CAN DO IS
DETERMINE A"TOLERANCE RANGE" OF THEIR POSSIBLE VALUES.
IF, FOR EXAMPLE, A VALUE OF A VARIABLE NEAR ONE END OF THE
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TOLERANCE RANGE IS INTRODUCED INTO A COMPUTER MODEL, THE
MODEL MIGHT PREDICT THAT GAS INJECTION WOULD BE THE BEST
WAY TO INCREASE TOTAL RESERVES WHEREAS IF THE VALUE OF THE
VARIABLE IS ASSUMED TO BE NEAR THE OTHER END OF THE RANGE,
THE MODEL MIGHT PREDICT THAT WATER INJECTION WOULD BE THE
BEST WAY TO INCREASE TOTAL RECOVERY. THUS, IT IS STILL NOT
KNOWN WHETHER IRAN'S COSTLY GAS INJECTION PROJECTS, NOW
BEING DESIGNED OR UNDER CONSTRUCTION, WILL IN FACT PROVE

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TO HAVE BEEN WORTH THE EFFORT.

4. THE FOREGOING WAS INTENDED TO GIVE NEA/IRN AND ANY OTHER INTERESTED OFFICES A PICTURE OF THE TECHNICAL DIFFICULTIES THAT MAKE RESERVES FIGURES IN IRAN A DOUBTFUL QUANTITY. HAFT KEL, FOR EXAMPLE, IS AN OLD RESERVOIR ABOUT WHICH THERE HAS BEEN MUCH POLITICAL CONTROVERSY BETWEEN THE NIOC AND THE CONSORTIUM, WITH NIOC HAVING ACCUSED THE CONSORTIUM OF IRREMEDIABLY DAMAGING THIS RESERVOIR BY NOT BEGINNING GAS INJECTION EARLIER. SOME RESERVOIR ENGINEERS(BOTH IRANIAN AND EXPATRIATE) SAY, HOWEVER, THAT HAFT KEL IS AN EXTRAORDINARILY GOOD RESERVOIR WITH A BEAUTIFUL NATURAL DRIVE MECHANISM. THESE ENGINEERS FEEL THAT IN FACT GAS INJECTION INSELF COULD DAMAGE THE RESERVOIR, RESULTING IN DECREASED PRODUCTION. EVEN THE MOST OPTIMISTIC ESTIMATES SHOW ONLY A SMALL INCREASE IN PRODUCTION FORM THIS RESERVOIR AS A RESULT OF GAS INJECTION, AND AT LEAST SOME NIOC EXECUTIVES ARE BEGINNING TO WONDER WHETHER THE HAFT KEL INJECTION PROJECT WILL BE WORTH THE COST. MOST SEEM TO AGREE THAT GACHSARAN RESERVOIR NEEDS AND SHOULD BENEFIT SIGNIFICANTLY FROM GAS INJECTION, BUT EACH RESERVOIR IS DIFFERENT AND GREAT UNCERTAINTY EXISTS ABOUT MOST OF THEM.

5. AS TO THE PRODUCTION PROGRAMS BASED ON ESTIMATED RESERVES, THEY ARE SHOWN IN THE FOLLOWING TABLES (KHUZESTAN FIELD ONLY):

1977-1981

I. CAPACITY SCHEDULE (IN MILLION B/D)

1977 1978 1979 1980 1981
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TOTAL INSTALLED
CAPACITY 6.4 6.45 6.48 6.37 6.3

CRUDE OIL ONLY
(EXCLUDES NGC'S) 6.37 6.38 6.34 6.28 6.19

AVAILABLE FOR
EXPORT 5.55 5.45 5.3 5.2 5.1

IRANIAN LIGHT CURDE
AS PERCENT OF
TOTAL EXPORTS 50.2 48.5 46.1 43.7 43.5

II. TOTAL CAPACITY, 1981-91(IN MILLION B/D)
81 82 83 84 85 86 87 88 89 90 91

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6.37 6.39 6.47 6.4 6.3 5.9 5.6 5.3 5.0 4.8 4.6

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INFO OCT-01 SS-14 ISO-00 INR-05 EB-03 OES-02 SP-02 L-01

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AMEMBASSY KUWAIT

C O N F I D E N T I A L SECTION 2 OF 2 TEHRAN 6774

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FOR NAAS, NEA/IRN

IT SHOULD BE NOTED THAT "TOTAL INSTIALLED CAPACITY" IS JUST
THAT: ACTUAL OPERATING CAPACITY(ALLOWING FOR MAINTENANCE
TIME) IS ABOUT 95 PERCENT OF THE "TOTAL CPAPCITIES" SHOWN
IN THE TABLES. IN TABLE I, THE AMOUNT "AVAILABLE FOR EXPORT"
OBVIOUSLY DEPENDS ON PROJECTED DOMESTIC CONSUMPTION, ALL
BUT A TRICKLE OF WHICH IS SUPPLIED FROM THE KHUZESTAN FIELDS.
IN THE PREDICTIONS IT HAS GIVEN TO THE CONSORTIUM, PLEASE
NOTE, NIOC HAS CONSISTENTLY OVERESTIMATED THE RATE OF GROWTH
OF DOMESTIC CONSUMPTION. IT IS CONCEIVABLE THAT INCREASED
DOMESTIC USE OF NATURAL GAS AND SOME NUCLEAR POWER COULD
REDUCE GROWTH IN CONSUMPTION OF PETROLEUM PRODUCTS FROM
THE MID-1980'S ON. ALSO NOTEWORTHY WITH RESPECT TO THE
ABOVE TABLES IS THAT THEY INCLUDE RPEAT INCLUDE ESTIMATES
OF ADDED FUTURE PRODUCTION DUE TO(A) GAS INJECTION AND
(B) ANTICIPATED NEW DISCOVERIES. THE UNCERTAINTIES OF GAS
INJECTION WERE DISCUSSED ABOVE; THE ESTIMATE OF PRODUCTION
FROM FUTURE "NEW DISCOVERIES" WERE DESCRIBED BY ONE
PETROLEUM ENGINEER AS "PURE PIE IN THE SKY". SOME OF

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THESE "NEW DISCOVERIES" ESTIMATES ARE AS FOLLOWS:
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PRODUCTION FROM NEW DISCOVERIES(THOUSAND B/D)

1981 1983 1985 1987 1988 ON
70 150 230 310 350

6. MANY PETROLEUM ENGINEERS BELIEVE THAT THE PRODUCTION PROGRAM OUTLINED IN THE PRECEDING PARAGRAPH IS CONSERVATIVE AND THAT IF NIOC WISHED TO DEVOTE RESOURCES OF CAPTIAL AND LABOR TO MAXIMIZING PRODUCTION INSTEAD OF TO GAS INJECTION, PRODUCTION IN THE KHUZESTAN FIELDS COULD EASILY BE RAISED TO TEH EARLIER TARGET OF 8.0 MILLION B/D AND THAT THIS LEVEL COULD BE MAINTAINED THROUGH THE MID-1980'S. ENGINEERS CONSIDER THE LATE 80'S/EARLY 90'S TO BE SO FAR IN THE FUTURE THAT PREDICTION IS PURE SPECULATION, BUT MOST EXPECT ACCELERATING DECLINE BY THAT TIME. A KEY FACT IS THAT MOST OF IRAN'S PRODUCTION COMES FROM A VERY FEW SUPERGIANT FIELDS (SEE OSCO MONTHLY REPORTS TRANSMITTED BY AIRGRAM). NO NEW FIELDS EVEN APPROACHING THEIR SIZE HAVE BEEN FOUND SINCE THE DISCOVERY OF AHVAZ FIELD IN THE MID-1960'S AND NO PROMISING BIG STURCTURES HAVE BEEN FOUND DESPITE EXTENSIVE SEISMIC WORK. PROSPECTS ARE NOT BRIGHT.

7. THE REST OF IRAN ALSO DOES NOT OFFER A PROMISING PICTURE. THE PRESENT PRODUCING JOINT VENTURES (IPAC, SIRIP, LAPCO AND IMINOCO) HAVE RESERVES OF PERHAPS 6 BILLION BARRELS. THEY WILL BUILD FROM A PRESENT CAPACITY OF ABOUT 550-600 THOUSAND B/D TO ABOUT 750 THOUSAND IN A YEAR OR TWO AND THEN, AS AGROUP, SLOWLY DECLINE. BEGINNING LATER THIS YEAR OR IN 1977, SOFIRAN WILL BEGIN PRODUCTION FROM ITS SMALL OFFSHORE FIELDS AND ADD PERHAPS 60-100,000 B/D. NIOC HAS SOME SMALL FINDS NEAR SHIRAZ WHICH COULD POSSIBLY PRODUCE AS MUCH AS 100-150 THOUSAND BARRELS PER DAY IN THE 1980'S. THE FIVE COMPANIES WHO SIGNED SERVICE CONTRACTS WITH NIOC IN 1974(DEMINEX, CFP, AGIP, ULTRAMAR AND ASHLAND-PANCANADIAN-THE LAST KNOWN AS LAREX) APPEAR TO HAVE HAD LITTLE LUCK SO FAR. THE NIOC-MOBIL-JAPANESE JOINT VENTURE, IRAN-NIPPON, HAS DRILLED NINE DRY HOLES IN WHAT HAD BEEN CONSIDERED ONE OF THE MOST PROMISING REMAINING AREAS IN IRAN-LORESTAN, NORHT OF THE KHUZESTAN FIELDS. AN IOC-MOBIL-PETROBRAS
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JOINT VENTURE, HOPECO, IS EXPLORING. PERHAPS OXY AND
NIOC WILL GET LUCKY AND FIND OIL IN THE CASPIAN, WHERE
REPORTEDLY A SOVIET SEISMIC TEAM WORKING FOR NIOC
FOUND EVIDENCE OF SOME STRUCTURES THAT COULD
CONCEIVABLY BE OIL-BERING.

8. IF WHAT EMERGES FROM THIS CABLE IS A MIXED AND
CONFUSED PICTURE, WE HAVE GIVEN AN ACCURATE IMPRESSION.
A FINAL NOTE: RESERVE FIGURES GIVEN ABOVE (WHICH MAY
LOOSELY BE CALLED" PROGRAM RESERVES") ADD TO ROUGHLY
65 BILLION BARRELS. IN UNCLASSIFIED REPORTS, WE WILL
BE USING THE FIGURE OF 70 BILLION, BECAUSE NIOC EXECUTIVES
HAVE USED THESE FIGURES TO US. THIS GIVES A RESERVES/
PRODUCTION (RIP) RATION OF 35 YEARS-ANOTHER DOUBTFUL FIGURE
IN IRAN.
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Message Attributes

Automatic Decaptioning: Z
Capture Date: 01 JAN 1994
Channel Indicators: n/a
Current Classification: UNCLASSIFIED
Concepts: PETROLEUM INDUSTRY, REPORTS, PRODUCTION DATA
Control Number: n/a
Copy: SINGLE
Draft Date: 05 JUL 1976
Decaption Date: 28 MAY 2004
Decaption Note: 25 YEAR REVIEW
Disposition Action: RELEASED
Disposition Approved on Date:
Disposition Authority: SmithRJ
Disposition Case Number: n/a
Disposition Comment: 25 YEAR REVIEW
Disposition Date: 28 MAY 2004
Disposition Event:
Disposition History: n/a
Disposition Reason:
Disposition Remarks:
Document Number: 1976TEHRAN06774
Document Source: CORE
Document Unique ID: 00
Drafter: n/a
Enclosure: n/a
Executive Order: GS
Errors: N/A
Film Number: D760259-0523
From: TEHRAN
Handling Restrictions: n/a
Image Path:
ISecure: 1
Legacy Key: link1976/newtext/t19760790/aaaadbgs.tel
Line Count: 293
Locator: TEXT ON-LINE, ON MICROFILM
Office: ACTION NEA
Original Classification: CONFIDENTIAL
Original Handling Restrictions: STADIS, LIMDIS
Original Previous Classification: n/a
Original Previous Handling Restrictions: n/a
Page Count: 6
Previous Channel Indicators: n/a
Previous Classification: CONFIDENTIAL
Previous Handling Restrictions: STADIS, LIMDIS
Reference: n/a
Review Action: RELEASED, APPROVED
Review Authority: SmithRJ
Review Comment: n/a
Review Content Flags:
Review Date: 08 JUN 2004
Review Event:
Review Exemptions: n/a
Review History: RELEASED <08 JUN 2004 by greeneet>; APPROVED <07 OCT 2004 by SmithRJ>
Review Markings:

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04 MAY 2006

Review Media Identifier:
Review Referrals: n/a
Review Release Date: n/a
Review Release Event: n/a
Review Transfer Date:
Review Withdrawn Fields: n/a
Secure: OPEN
Status: NATIVE
Subject: IRAN'S OIL RESERVES AND FUTURE PRODUCTION
TAGS: ENRG, IR
To: STATE
Type: TE
Markings: Margaret P. Grafeld Declassified/Released US Department of State EO Systematic Review 04 MAY 2006